



DEVELOPMENT OF NOVEL CELLULOSE NANOFIBER COMPOSITES FROM BANANA FIBERS

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Much research related to the use of natural fibers in polymeric matrix composites has been developed. The presence of –OH groups in the chemical components of the natural fibers generates an important hydrophilic tendency that produces adhesion lacks with hydrophobic polymeric matrices. Banana fibers at present are a waste product of banana cultivation. Moreover, without any additional cost input, banana fibers can be obtained in bulk quantity. In addition; earlier studies reported that banana fiber is found to be a good reinforcement in polymer resins. The increase in the surface area of the fibers allows more intimate contact between the fiber and the matrix. To increase the surface area of the fibers, steam explosion is employed. Steam-explosion process exposes the materials to a water vapour saturated environment under high temperature and pressure. The resulting steam exploded fibers are further bleached and treated with varying acid concentration to have a further reduction in size of the fibers. The characterizations of the fibers are done by Scanning Electron Microscope (SEM), Transmission Electron Microscope (TEM), Fourier Transform Infrared (FT-IR), Atomic Force Microscopy (AFM), Scanning Probe Microscope (SPM) and X-ray Diffraction (XRD) analysis. The SEM analysis shows changes in the surface morphology and reduction in size of the fibers. The TEM analysis also reveals the reduction of particle size to the nanometer range. The SPM analysis also supports the evidence for the reduction in particle size to the nanometer range. FT-IR analysis shows the dissolution of components present in the banana fiber. XRD analysis also supports the evidence for the reduction in size and the crystallinity of the fiber. These processed fibers can be used a better reinforcement in polymeric matrices. Mechanical properties of developed nanofiber reinforced Polypropylene composites were investigated.